

REMARKS

Upon entry of this Amendment, claims 1-20 will be pending in this application. Claims 9-12 are withdrawn from consideration.

Applicants are pleased to note the Examiner indicated that claims 13-15 are allowed and that claims 4-8 would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Claims 13-15 have been amended solely for clarifying the claim language without the intention of narrowing the scope of those claims. Claims 16-20 have been added. Claims 16-20 correspond respectively to allowable claims 4-8. No new matter has been introduced.

Election-Restrictions

In reply to the Restriction Requirement, Applicants hereby confirm election of Species I of Figure 1. Claims 1-8 and 13-15 read on this species. Claim 1 being generic to Species I, II and III.

Claim Rejections – 35 U.S.C. § 103

Claim 1-3 have been rejected under 35 U.S.C. § 103 (a) as being unpatentable over Otani *et al.* (Japanese Patent Publication 06-260434) in view of Hama *et al.* (US Pat. No. 5,525,159) and Omi *et al.* (Japanese Patent Publication 11-302824). The Applicant respectfully traverse this rejection for at least the following reasons.

Claim 1 has been amended to recite, *inter-alia*, “said lattice-like shower plate is formed of a metal pipe comprising a plurality of holes configured and arranged such that the process gas is obliquely incident on the surface of the substrate.” In the invention as recited in claim 1, the process gas is obliquely incident on the substrate so as to improve substrate in plane uniformity of a process. Indeed, when the process gas is incident obliquely the process gas is made to evenly spread over the entire surface of the substrate thus the process uniformity is greatly improved.

In contrast, the bipolar electrode 30 in Otani *et al.* has holes 34 such that the gas would exit vertically to electrode holder 18 (see, drawing 2 of Otani *et al.*). Similarly, in Hama *et al.*, the head 172 has pipe lattice 176 having supply holes 174 oriented downward as shown in Figures 12 and 14 of Hama *et al.* Therefore, in Hama *et al.* the gas exists through

the holes vertically (i.e., normal) to substrate S. With regard to Omi *et al.*, this reference merely discusses a method for forming passivated film of aluminum oxide to provide a fluid feed system for a highly corrosive fluid. Consequently, neither of Otani *et al.*, Hama *et al.* or Omi *et al.* disclose, teach or suggest alone or in combination the subject matter recited in claim 1. Therefore Applicants respectfully submit that claim 1, and claims 2-3 which depend from claim 1, are patentable and respectfully request that the rejection of claims 1-3 under § 103 be withdrawn.

Allowable Claims

Newly added claim 16 corresponds to allowable claim 4 rewritten by incorporating all the limitations of the base claim 1. Newly added claim 17 corresponds to allowable claim 5 rewritten by incorporating all the limitations of base claim 1. Newly added claim 18 corresponds to allowable claim 6 now dependent upon claim 17. Newly added claim 19 corresponds to allowable claim 7 rewritten by incorporating all the limitations of base claim 1. Newly added claim 20 corresponds to allowable claim 8 now dependent upon claim 19.

Therefore, Applicants respectfully submit that claims 16-20 are in form for allowance.

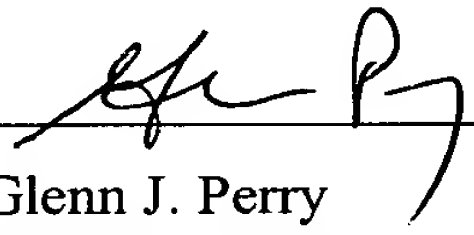
CONCLUSION

In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned **"Version with markings to show changes made"**.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,
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Enclosure: Appendix

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

The claims have been amended as follows:

1. (Amended) A plasma processing apparatus for applying a process to a substrate [(114)] to be processed, the plasma processing apparatus comprising:
 - a chamber [(101)] of which interior can be depressurized,
 - a gas supply system [for supplying] constructed and arranged to supply a gas to the chamber and an exhaust system [for exhausting] configured and arranged to exhaust the gas supplied to the chamber and [for depressurizing] to depressurize the chamber;
 - a part of a wall constituting the chamber [(101)] being a flat plate dielectric material plate [(102)] formed of a material which passes a microwave therethrough substantially without a loss;
 - a flat plate dielectric material shower plate [(103)], which is formed of a material which passes a microwave therethrough substantially without a loss, being provided between the dielectric material plate and plasma excited in the chamber;
 - a plurality of gas discharge holes [(107)] being formed in the dielectric material shower plate so that at least a part of the gas supplied by the gas supply system is discharged through the plurality of gas discharge holes [(107)] through a gap [(104)] between the dielectric material plate [(102)] and the dielectric material shower plate [(103)];
 - a flat plate slot antenna [(110)] being provided on an outer side of the chamber [(101)] with the dielectric material plate [(102)] interposed therebetween so as to supply a microwave for exciting plasma through the dielectric material plate;
 - an electrode [(115)] being provided on an inner side of the chamber so as to hold the substrate [(114)] to be processed[.];
 - [characterized in that] a lattice-like shower plate [(111; 600; 700) is] provided between the dielectric material shower plate [(103)] and the substrate [(114)] to be processed so as to discharge a gas, which has a composition different from that of the gas discharged from the dielectric material shower plate, to a side of the substrate to be processed; and

at least a part of the gas discharged from the dielectric material shower plate [(103)] flows to the side of the substrate to be processed by being passed through an opening part [(206; 607; 707)] of the lattice-like shower plate,

wherein said lattice-like shower plate is formed of a metal pipe comprising a plurality of gas discharge holes configured and arranged such that the process gas is obliquely incident on the surface of the substrate.

2. (Amended) The plasma processing apparatus claimed in claim 1,
[characterized in that said lattice-like shower plate (111; 600) is formed of a metal pipe;]

wherein [a] said plurality of gas discharged holes [(203; 603)] are provided to the metal pipe on a side facing the substrate to be processed[;], and the metal pipe is grounded.

3. (Amended) The plasma processing apparatus as claimed in claim 2,
[characterized in that] wherein said metal pipe is formed of a stainless steel containing aluminum, and a surface thereof is covered by a passivation film mainly formed of aluminum oxide.

4. (Amended) The plasma processing apparatus as claimed in claim 1,
[characterized in that] wherein said dielectric material shower plate [(103)] and said lattice-like shower plate [(111; 600; 700)] are arranged substantially parallel to each other, and a distance therebetween is substantially equal to a multiple of a quarter of a wavelength of said microwave in a vacuum.

5. (Amended) The plasma processing apparatus as claimed in one of claims 1 to 4,
[characterized in that] wherein said dielectric material plate [(102)] and said dielectric material shower plate [(103)] are arranged substantially parallel to each other, and a distance between a surface of said dielectric material plate [(102)] facing said slot antenna and a surface of said substrate to be processed is substantially equal to an odd multiple of a quarter of a wavelength of said microwave in a corresponding part.

6. (Amended) The plasma processing apparatus as claimed in claim 5,
[characterized in that] wherein said slot antenna [(110)] and said dielectric material plate [(102)] are arranged substantially parallel to each other, and a distance therebetween is substantially equal to an odd multiple of a quarter of a wavelength of said microwave in a corresponding part.
7. (Amended) The plasma processing apparatus as claimed in one of claims 1 to 4,
[characterized in that] wherein a thickness of said dielectric material shower plate [(103)] is an integral multiple of a half of a wavelength of said microwave in a corresponding part.
8. (Amended) The plasma processing apparatus as claimed in claim 7,
[characterized in that] wherein said slot antenna [(110)] and said dielectric material plate [(102)] are arranged substantially parallel to each other, and a distance therebetween is substantially equal to an odd multiple of a quarter of a wavelength of said microwave in a corresponding part.
13. (Amended) A plasma processing apparatus for applying a process to a substrate to be processed, the plasma processing apparatus comprising:
a chamber [(101)] of which interior can be depressurized[.];
a gas supply system [for supplying] constructed and arranged to supply a gas to the chamber and an exhaust system [for exhausting] configured and arranged to exhaust the gas supplied to the chamber and [for depressurizing] to depressurize the chamber;
a part of a wall constituting the chamber being a flat plate dielectric material plate [(102)] formed of a material which passes a microwave therethrough substantially without a loss;
a flat plate dielectric material shower plate [(103)], which is formed of a material which passes a microwave therethrough substantially without a loss, being provided between the dielectric material plate and plasma excited in the chamber;
a plurality of gas discharge holes [(107)] being formed in the dielectric material shower plate so that at least a part of the gas supplied by the gas supply system is discharged

through the plurality of gas discharge holes [(107)] through a gap [(104)] between the dielectric material plate [(102)] and the dielectric material shower plate [(103)];

a flat plate slot antenna [(110)] being provided on an outer side of the chamber [(101)] with the dielectric material plate [(102)] interposed therebetween so as to supply a microwave for exciting plasma through the dielectric material plate;

an electrode [(115)] being provided on an inner side of the chamber so as to hold the substrate [(114)] to be processed,

[characterized in that] wherein the slot antenna [(110)], the dielectric material plate [(102)] and the dielectric material shower plate [(103)] are arranged substantially parallel to each, and a distance between a surface of the dielectric material plate [(102)] facing said slot antenna and a surface of said dielectric material shower plate [(103)] facing said substrate to be processed is substantially equal to an odd multiple of a quarter of a wavelength of said microwave in a corresponding part.

14. (Amended) The plasma processing apparatus as claimed in claim 13,

[characterized in that] wherein a thickness of said dielectric material shower plate [(103)] is an integral multiple of a half of a wavelength of said microwave in a corresponding part.

15. (Amended) The plasma processing apparatus as claimed in claim 13 or 14,

[characterized in that] wherein a distance between said slot antenna [(110)] and said dielectric material plate [(102)] is substantially equal to an odd multiple of a quarter of a wavelength of said microwave in a corresponding part.

End of Appendix